2018 Mississippi College- and Career-Readiness Standards for Science				
Book: Tro, Introductory Chemistry, © 2024				
Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
CHE.1 Mathematical and Computational Analysis	Mathematical and computational analysis is a key component of scientific investigation and prediction of outcomes. These components create a more student-centered classroom.	CHE.1 Students will use mathematical and computational analysis to evaluate problems.	CHE.1.1 Use dimensional analysis (factor/label) and significant figures to convert units and solve problems.	Chapter 2: Measurement and Problem Solving 2.3 Significant Figures: Writing Numbers to Reflect Precision Pages 19-25 2.6 Problem Solving and Unit Conversion Pages 31-35 2.7 Solving Multistep Unit Conversion Problems Pages 36-27 Chapter 2: Exercises Significant Figures Q 41-46 Page 54 Unit Conversion Q 69-86 Pages 57-59
			CHE.1.2 Design and conduct experiments using appropriate	Chapter 11: Gases

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			measurements, significant figures, graphical analysis to analyze data.	11.4 Boyle's Law: Pressure and Volume Pages 373-378 11.5 Charles's Law: Volume and Temperature Pages 378-382 Chapter 11: Exercises Highlight Problems Q 129 Page 413 Graphical Analysis Chapter 11: Exercises Data Interpretation and Analysis Q 134 Page 415
			CHE.1.3 Enrichment: Research information from multiple appropriate sources and assess the credibility, accuracy, possible bias, and conclusions of each publication.	The text does not provide an opportunity for students to try this enrichment activity.

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
CHE.2 Atomic Theory	Atomic theory is the foundation of modern chemistry concepts. Students must be presented with a solid foundation of the atom and its components. These concepts lead to an understanding of the interactions of these components to explain macro-observations of the world.	CHE.2 Students will demonstrate an understanding of the atomic structure and the historical developments leading to modern atomic theory.	CHE.2.1 Investigate the historical progression leading to the modern atomic theory, including, but not limited to, work done by Dalton, Rutherford's gold foil experiment, Thomson's cathode ray experiment, Millikan's oil drop experiment, and Bohr's interpretation of bright line spectra.	Chapter 4: Atoms and Elements 4.3 The Nuclear Atom Pages 107-109 Chapter 4: Exercises Q 2, 3, 4 Page 131 Chapter 9: Electrons in Atoms and the Periodic Table 9.4 The Bohr Model: Atoms in Orbits Pages 300-302 Chapter 9: Exercises Q 1 Page 324
			CHE.2.2 Construct models (e.g., ball and stick, online simulations, mathematical computations) of atomic nuclei to explain the abundance weighted average (relative mass) of elements and	Chapter 4: Atoms and Elements 4.9 Atomic Mass: The Average Mass of An Element's Atoms Pages 125-126 Chapter 4: Exercises Problems

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			isotopes on the published mass of elements.	Q 101-106 Page 137
			CHE.2.3 Investigate absorption and emission spectra to interpret explanations of electrons at discrete energy levels using tools such as online simulations, spectrometers, prisms, flame tests, and discharge tubes. Explore both laboratory experiments and real-world examples.	Partial coverage: The text does not cover absorption spectra using online simulations, spectrometers, or flame tests. Students do not examine lab experiments or real-world examples. The citations below are for emission spectra using prisms. Chapter 9: Electrons in Atoms and the Periodic Table 9.4 The Bohr Model: Atoms in Orbits Pages 300-302 Chapter 9: Exercises Q 14 Page 324 The Bohr Model Q 41, 42 Page 325

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.2.4 Research appropriate sources to evaluate the way absorption and emission spectra are used to study astronomy and the formation of the universe.	The text does not cover this concept.
CHE.3 Periodic Table	Modern chemistry is based on the predictability of atomic behavior. Periodic patterns in elements led to the development of the periodic table. Electron configuration is a direct result of this periodic behavior. The predictable behavior of electrons has led to the discovery of new compounds, elements, and atomic interactions. Predictability of atom behavior is a key to understanding ionic and covalent bonding and production of compounds or molecules.	CHE.3 Students will demonstrate an understanding of the periodic table as a systematic representation to predict properties of elements.	CHE.3.1 Explore and communicate the organization of the periodic table, including history, groups, families, family names, metals, nonmetals, metalloids, and transition metals.	Chapter 4: Atoms and Elements 4.6 Looking for Patterns: The Periodic Law and the Periodic Table Pages 114-118 Chapter 4: Exercises Q 13-18 Page 130

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.3.2 Analyze properties of atoms and ions (e.g., metal/nonmetal/metalloid behavior, electrical/heat conductivity, electronegativity and electron affinity, ionization energy, and atomic/ionic radii) using periodic trends of elements based on the periodic table.	Chapter 4: Atoms and Elements 4.6 Looking for Patterns: The Periodic Law and the Periodic Table Pages 114-118 4.7 Ions: Losing and Gaining Electrons Pages 118-121 Chapter 4: Exercises Q 19-21 Page 130
			CHE.3.3 Analyze the periodic table to identify quantum numbers (e.g., valence shell electrons, energy level, orbitals, sublevels, and oxidation numbers).	Chapter 9: Electrons in Atoms and the Periodic Table 9.5 The Quantum-Mechanical Model: Atoms with Orbitals Pages 302-303 9.6 Quantum-Mechanical Orbitals and Electron Configurations Pages 304-310 9.7 Electron Configurations and the Periodic Table Pages 310-313

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 9: Exercises Q 18-20 Page 324 Problems Q 65-68 Page 326
CHE.4 Bonding	A firm understanding of bonding is necessary to further development of the basic chemical concepts of compounds and chemical interactions.	CHE.4 Students will demonstrate an understanding of the types of bonds and resulting atomic structures for the classification of chemical compounds.	CHE.4.1 Develop and use models (e.g., Lewis dot, 3-D ball-stick, 3-D printing, or simulation programs such as PhET) to predict the type of bonding between atoms and the shape of simple compounds.	Chapter 10: Chemical Bonding 10.2 Representing Valence Electrons with Dots Pages 334-335 10.7 Predicting the Shape of Molecules Pages 344-348 Chapter 10: Exercises Q 3 Page 358 Problems Q 23-34 Page 358 Q 65-78

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Chemistry Standards Total Standards: 12				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Pages 360-361
			CHE.4.2 Use models such as Lewis structures and ball and stick models to depict the valence electrons and their role in the formation of ionic and covalent bonds.	Chapter 10: Chemical Bonding 10.3 Lewis Structures of Ionic Compounds: Electrons Transferred Pages 335-336 10.4 Covalent Lewis Structures: Electrons Shared Pages 336-338 10.5 Writing Lewis Structures for Covalent Compounds Pages 339-341 Chapter 10: Exercises Q 5, 8 Page 358 Problems Q 35-54 Pages 358-359
			CHE.4.3 Predict the ionic or covalent nature of different	Chapter 10: Chemical Bonding

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			atoms based on electronegativity trends and/or position on the periodic table.	10.8 Electronegativity and Polarity: Why Oil and Water Don't Mix Page 349 Chapter 10: Exercises Cumulative Problems Q 97-98 Page 362
			CHE.4.4 Use models and oxidation numbers to predict the type of bond, shape of the compound, and the polarity of the compound.	Partial coverage: The text does not explain how oxidation numbers can be used to predict the type of bond, shape of the compound, etc. The citations below use the Lewis model, the space-filling model, and the ball-and-stick model. Chapter 10: Chemical Bonding 10.8 Electronegativity and Polarity: Why Oil and Water Don't Mix Page 349 Chapter 10: Exercises Cumulative Problems Q 97-98 Page 362

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.4.5 Use models of simple hydrocarbons to exemplify structural isomerism.	Chapter 18: Organic Chemistry 18.6 Isomers: Same Formula, Different Structure Pages 655-656 Chapter 18: Exercises Q 39-42 Page 684
			CHE.4.6 Use mathematical and computational analysis to determine the empirical formula and the percent composition of compounds.	Chapter 6: Chemical Compounds 6.6 Mass Chemical Composition of Compounds Page 191 6.7 Mass Percent Composition from a Chemical Formula Pages 192-193 6.8 Calculating Empirical Formulas for Compounds Pages 194-195 Chapter 6: Exercises Q 8, 11-16 Page 205

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Problems Q 83-102 Pages 209-210
			CHE.4.7 Use scientific investigation to determine the percentage of composition for a substance (e.g., sugar in gum, water and/or unpopped kernels in popcorn, percent water in a hydrate). Compare results to justify conclusions based on experimental evidence.	The text does not cover this topic. The citation below is for instances where students calculate percentage composition using mathematical computations and from chemical formulae. Chapter 6: Exercises Problems Q 78-79, 83-90 Page 208, 209
			CHE.4.8 Plan and conduct controlled scientific investigations to produce mathematical evidence of the empirical composition of a compound.	The text does not cover this standard.
CHE.5 Naming Compounds	Polyatomic ions (radicals) and oxidation numbers are used to predict how	CHE.5 Students will investigate and understand the accepted	CHE.5.1 Use the periodic table and a list of common polyatomic ions as a model to derive	Chapter 5: Molecules and Compounds 5.7 Naming Ionic Compounds

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
	metallic ions, nonmetals, and transition metals are used in naming compounds.	nomenclature used to identify the name and chemical formulas of compounds.	chemical compound formulas from compound names and compound names from chemical formulas.	Pages 153-156 Chapter 5: Exercises Q 13-17 Page 167 Problems Q 59-66 Page 170
			CHE.5.2 Generate formulas of ionic and covalent compounds from compound names. Discuss compounds in everyday life and compile lists and uses of these chemicals.	Chapter 5: Exercises Questions for Group Work Q 112, 114 Page 175
			CHE.5.3 Generate names of ionic and covalent compounds from their formulas. Name binary compounds, binary acids, stock compounds, ternary compounds, and ternary acids.	Partial coverage: The text does not cover ternary compounds and ternary acids. Chapter 5: Molecules and Compounds 5.7 Naming Ionic Compounds Pages 152-156 Chapter 5: Exercises

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Chemistry Standards Total Standards: 12				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Problems Q 59-66 Page 170
CHE.6 Chemical Reactions	Understanding chemical reactions and predicting products of these reactions is essential to student success.	CHE.6 Students will demonstrate an understanding of the types, causes, and effects of chemical reactions.	CHE.6.1 Develop and use models to predict the products of chemical reactions (e.g., synthesis reactions; single replacement; double displacement; and decomposition, including exceptions such as decomposition of hydroxides, chlorates, carbonates, and acids). Discuss and/or compile lists of reactions used in everyday life.	Partial coverage: Students learn about the different types of chemical reactions, but they do not use models to predict the products. Chapter 7: Chemical Reactions 7.1 Grade School Volcanoes, Automobiles, and Laundry Detergents Page 216 7.10 Classifying Chemical Reactions Classifying Chemical Reactions by What Atoms Do Pages 238-240
			CHE.6.2 Plan, conduct, and communicate the results of investigations to demonstrate different types of simple chemical reactions.	The text does not require students to carry out investigations to demonstrate different chemical reactions and communicate the results.

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.6.3 Use mathematics and computational analysis to represent the ratio of reactants and products in terms of masses, molecules, and moles (stoichiometry).	Chapter 8: Quantities in Chemical Reactions 8.3 Making Molecules: Mole-to-Mole Conversions Pages 259-261 8.4 Making Molecules: Mass-to-Mass Conversions Pages 261-263 Chapter 8: Exercises Q 2 Page 281 Problems Q 15-45 Pages 281-283
			CHE.6.4 Use mathematics and computational analysis to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. Give real-world examples (e.g., burning wood).	Chapter 7: Chemical Reactions 7.3 The Chemical Equation Pages 219-220

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.6.5 Plan and conduct a controlled scientific investigation to produce mathematical evidence that mass is conserved. Use percent error to analyze the accuracy of results.	The text does not cover this concept.
			CHE.6.6 Use mathematics and computational analysis to support the concept of percent yield and limiting reagent.	Chapter 8: Quantities in Chemical Reactions 8.5 More Pancakes: Limiting Reactant, Theoretical Yield, and Percent Yield Pages 264-268 Chapter 8: Exercises Problems Q 47-72 Pages 284-287
			CHE.6.7 Plan and conduct a controlled scientific investigation to produce mathematical evidence to predict and confirm the limiting reagent and percent yield in the reaction. Analyze quantitative data, draw	Partial coverage: Students do not plan and conduct scientific investigations. However, the following question requires them to analyze quantitative data, draw conclusions, and communicate findings.

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			conclusions, and communicate findings. Compare and analyze class data for validity.	Chapter 8: Exercises Data Interpretation and Analysis Q 110 Page 291
CHE.7 Gas Laws	The comparison and development of the molecular states of matter are an integral part of understanding matter. Pressure, volume, and temperature are imperative to understanding the states of matter.	CHE.7 Students will demonstrate an understanding of the structure and behavior of gases.	CHE.7.1 Analyze the behavior of ideal and real gases in terms of pressure, volume, temperature, and number of particles.	Chapter 11: Gases 11.8 The Ideal Gas Law: Pressure, Volume, Temperature, and Moles Pages 386-392 Chapter 11: Exercises Q 14, 15 Page 409
			CHE.7.2 Enrichment: Use an engineering design process to develop models (e.g., online simulations or student interactive activities) to explain and predict the behavior of each state of matter using the movement of particles and intermolecular forces to explain the behavior of matter.*	Partial coverage: students learn about the theory but do not develop models using engineering design processes. Chapter 11: Gases 11.2 Kinetic Molecular Theory: A Model for Gases Pages 369-370

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Chemistry Standards Total Standards: 12				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 11: Exercises Highlight Problems Q 129 Page 413
			CHE.7.3 Analyze and interpret heating curve graphs to explain the energy relationship between states of matter (e.g., thermochemistry-water heating from -20^{o}C to 120^{o}C).	Chapter 12: Liquids, Solids, and Intermolecular Forces 12.5 Melting, Freezing, and Sublimation Pages 426-429
			CHE.7.4 Use mathematical computations to describe the relationships comparing pressure, temperature, volume, and number of particles, including Boyle's law, Charles's law, Dalton's law, combined gas laws, and ideal gas laws.	Chapter 11: Gases 11.4 Boyle's Law: Pressure and Volume Pages 373-378 11.5 Charles's Law: Volume and Temperature Pages 378-382 11.6 The Combined Gas Law: Pressure, Volume, and Temperature Pages 382-384

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				11.8 The Ideal Gas Law: Pressure, Volume, Temperature, and Moles Pages 386-392 11.9 Mixture of Gases Pages 392-394
			CHE.7.5 Enrichment: Use an engineering design process and online simulations or lab investigations to design and model the results of controlled scientific investigations to produce mathematical evidence that confirms the gas-laws relationships.*	The text does not cover this concept.
			CHE.7.6 Use the ideal gas law to support the prediction of volume, mass, and number of particles produced in chemical reactions (i.e., gas stoichiometry).	Chapter 11: Gases 11.8 The Ideal Gas Law: Pressure, Volume, Temperature, and Moles Pages 386-392 Chapter 11: Exercises Problems Q 69-70 Page 409

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Chemistry Standards Total Standards: 12				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.7.7 Plan and conduct controlled scientific investigations to produce mathematical evidence that confirms that reactions involving gases conform to the law of conservation of mass.	The text does not cover this concept.
			CHE.7.8 Enrichment: Using gas stoichiometry, calculate the volume of carbon dioxide needed to inflate a balloon to occupy a specific volume. Use an engineering design process to design, construct, evaluate, and improve a simulated air bag.*	Chapter 11: Exercises Highlight Problems Q 127 Page 413
CHE.8 Solutions	Solutions exist as solids, liquids, or gases. Solution concentration is expressed by specifying relative amounts of solute to solvent.	CHE.8 Students will demonstrate an understanding of the nature of properties of various types of chemical solutions.	CHE.8.1 Use mathematical and computational analysis to quantitatively express the concentration of solutions using the concepts such as molarity, percent by mass, and dilution.	Chapter 13: Solutions 13.5 Specifying Solution Concentration: Mass Percent Pages 460-462 13.6 Specifying Solution Concentration: Molarity Pages 463-466 13.7 Solution Dilution

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Pages 466-468 Chapter 13: Exercises Problems Q 43-90 Pages 484-487
			CHE.8.2 Develop and use models (e.g., online simulations, games, or video representations) to explain the dissolving process in solvents on the molecular level.	Chapter 13: Solutions 13.3 Solutions of Solids Dissolved in Water: How to Make Rock Candy Pages 455-458
			CHE.8.3 Analyze and interpret data to predict the effect of temperature and pressure on solids and gases dissolved in water.	Partial coverage: The text explains the concept of gases dissolved in water but does not analyze and interpret data. Chapter 13: Solutions 13.4 Solutions of Gases in Water: How Soda Pop Gets Its Fizz Pages 458-460 Chapter 13: Exercises Problems Q 42 Page 484

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Chemistry Standards Total Standards: 12				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.8.4 Design, conduct, and communicate the results of experiments to test the conductivity of common ionic and covalent compounds in solution.	Chapter 14: Acids and Bases 14.7 Strong and Weak Acids and Bases Pages 505-509
			CHE.8.5 Use mathematical and computational analysis to analyze molarity, molality, dilution, and percentage dilution problems.	Chapter 13: Solutions Chapter 13: Exercises Problems Q 42 Page 484
			CHE.8.6 Design, conduct, and communicate the results of experiments to produce a specified volume of a solution of a specific molarity, and dilute a solution of a known molarity.	Partial coverage: Students learn about the concepts but do not conduct experiments. Chapter 13: Solutions 13.6 Specifying Solution Concentration: Molarity Pages 463-466 13.7 Solution Dilution Pages 466-468

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			CHE.8.7 Use mathematical and computational analysis to predict the results of reactions using the concentration of solutions (i.e., solution stoichiometry).	Chapter 13: Solutions 13.8 Solution Stoichiometry Pages 468-471 Chapter 13: Exercises Problems Q 91-98 Page 487
			CHE.8.8 Enrichment: Investigate parts per million and/or parts per billion as it applies to environmental concerns in your geographic region, and reference laws that govern these factors.	Chapter 13: Exercises Data Interpretation and Analysis Q 143 Page 490
CHE.9 Acids and Bases (Enrichment)		CHE.9 Enrichment: Students will understand the nature and properties of acids, bases, and salt solutions.	CHE.9.1 Enrichment: Analyze and interpret data to describe the properties of acids, bases, and salts.	Chapter 14: Acids and Bases 14.9 The pH and pOH Scales: Ways to Express Acidity and Basicity Page 512
			CHE.9.2 Enrichment: Analyze and interpret data to identify differences between strong and weak acids and bases (i.e., dissociation).	Chapter 14: Acids and Bases 14.7 Strong and Weak Acids and Bases Pages 505-509

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 14: Exercises Questions Q 20 Page 524 Problems Q 54-61 Page 526 Highlight Problems Q 121 Page 530
			CHE.9.3 Enrichment: Plan and conduct investigations using the pH scale to classify acid and base solutions.	Chapter 14: Acids and Bases 14.9 The pH and pOH Scales: Ways to Express Acidity and Basicity Page 512 Chapter 14: Exercises Problems Q 63-70 Page 527
			CHE.9.4 Enrichment: Analyze and evaluate the Arrhenius, Bronsted-Lowry, and Lewis acid-base definitions.	Chapter 14: Acids and Bases 14.4 Molecular Definitions of Acids and Bases Pages 497-499

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 14: Exercises Questions Q 7-10 Page 524 Problems Q 29-32 Page 524
			CHE.9.5 Enrichment: Use mathematical and computational thinking to calculate pH from the hydrogen-ion concentration.	Chapter 14: Acids and Bases 14.9 The pH and pOH Scales: Ways to Express Acidity and Basicity Page 512 Chapter 14: Exercises Problems Q 63-70 Page 527
			CHE.9.6 Enrichment: Obtain, evaluate, and communicate information about how buffers stabilize pH in acid-base reactions.	Chapter 14: Acids and Bases 14.10 Buffers: Solutions That Resist pH Change Pages 516-518 Chapter 14: Exercises Questions

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Q 27-28 Page 524 Problems Q 89-92 Page 529
CHE.10 Thermochemistry (Enrichment)		CHE.10 Enrichment: Students will understand that energy is exchanged or transformed in all chemical reactions.	CHE.10.1 Enrichment: Construct explanations to explain how temperature and heat flow in terms of the motion of molecules (or atoms).	Chapter 3: Matter and Energy Chapter 13: Exercises Highlight Problems Q 121 Page 101
			CHE.10.2 Enrichment: Classify chemical reactions and phase changes as exothermic or endothermic based on enthalpy values. Use a graphical representation to illustrate the energy changes involved.	Chapter 8: Quantities in Chemical Reactions 8.7 Enthalpy: A Measure of the Heat Evolved or Absorbed in a Reaction Pages 272-275 Chapter 8: Exercises Questions Q 14 Page 281 Problems Q 73-74

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Page 287
			CHE.10.3 Enrichment: Analyze and interpret data from energy diagrams and investigations to support claims that the amount of energy released or absorbed during a chemical reaction depends on changes in total bond energy.	The text does not cover this topic.
			CHE.10.4 Enrichment: Use mathematical and computational thinking to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change.	Chapter 3: Matter and Energy 3.12 Energy and Heat Capacity Calculations Pages 86-89 Chapter 3: Exercises Problems Q 79-82 Page 99
CHE.11 Equilibrium (Enrichment)		CHE.11 Enrichment: Students will understand that chemical equilibrium is a dynamic process at the molecular level.	CHE.11.1 Enrichment: Construct explanations to explain how to use Le Chatelier's principle to predict the effect of changes in concentration, temperature, and pressure.	Chapter 15: Chemical Equilibrium 15.8 The Effect of a Concentration Change on Equilibrium Pages 548-550 15.9 The Effect of a Volume Change on Equilibrium

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Pages 550-552 15.10 The Effect of a Temperature Change on Equilibrium Pages 553-555 Chapter 15: Exercises Questions Q 18-27 Page 566
			CHE.11.2 Enrichment: Predict when equilibrium is established in a chemical reaction.	Chapter 15: Chemical Equilibrium 15.3 The Idea of Dynamic Chemical Equilibrium Pages 537-539 Chapter 15: Exercises Questions Q 8, 10 Page 566
			CHE.11.3 Enrichment: Use mathematical and computational thinking to calculate an equilibrium constant expression for a reaction.	Chapter 15: Chemical Equilibrium 15.6 Calculating and Using Equilibrium Constants Pages 543-545 Chapter 15: Exercises

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Problems Q 51-64 Page 568-569
CHE.12 Organic Nomenclature (Enrichment)		CHE.12 Enrichment: Students will understand that the bonding characteristics of carbon allow the formation of many different organic molecules with various sizes, shapes, and chemical properties.	CHE.12.1 Enrichment: Construct explanations to explain the bonding characteristics of carbon that result in the formation of basic organic molecules.	Chapter 18: Organic Chemistry 18.3 Carbon: A Versatile Atom Pages 647-649 Chapter 18: Exercises Questions Q 5 Page 683
			CHE.12.2 Enrichment: Obtain information to communicate the system used for naming the basic linear hydrocarbons and isomers that contain single bonds, simple hydrocarbons with double and triple bonds, and simple molecules that contain a benzene ring.	Chapter 18: Organic Chemistry 18.4 Hydrocarbons: Compounds Containing Only Hydrogen and Carbon Pages 649-650 18.5 Alkanes: Saturated Hydrocarbons Pages 651-654 18.6 Isomers: Same Formula, Different Structure

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Chemistry Standards **Total Standards: 12**				
Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Pages 655-656 18.7 Naming Alkanes Pages 657-659 Chapter 18: Exercises Problems Q 43-44 Page 684
			CHE.12.3 Enrichment: Develop and use models to identify the functional groups that form the basis of alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids.	Chapter 18: Organic Chemistry 18.11 Functional Groups Page 667 18.12 Alcohol Pages 668-669 18.13 Ethers Page 670 18.14 Aldehydes and Ketones Page 671 18.15 Carboxylic Acids and Esters Page 672

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 18: Exercises Problems Q 83-86 Page 689

Objectives identified by "Enrichment:" are considered enrichment material that may be expanded upon as time permits. Engineering standards are represented in some performance objectives with specific wording that will prompt students to approach learning and exploration using the engineering process. These performance objectives are marked with an * at the end of the statement.